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Dynamic modeling of intelligent air-cushion tracked vehicle for swamp peat (Article)

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Abstract

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Modeling of the dynamic behavior and motion are renewed interest in the improved tractive performance of an intelligent air-cushion tracked vehicle (IACTV). This paper presents a new dynamical model for the forces on the developed small scale intelligent air-cushion tracked vehicle moving over swamp peat. The air cushion system partially supports the 25 % of vehicle total weight in order to make the vehicle ground contact pressure 7 kN/m2. As the air-cushion support system can adjust automatically on the terrain, so the vehicle can move over the terrain without any risks. The spring damper system is used with the vehicle body to control the aircushion support system on any undulating terrain by making the system sinusoidal form. Experiments have been carried out to investigate the relationships among tractive efficiency, slippage, traction coefficient, load distribution ratio, tractive effort, motion resistance and power consumption in given terrain conditions. Experiment and simulation results show that air-cushion system improves the vehicle performance by keeping traction coefficient of 71% and tractive efficiency of 62% and the developed model can meet the demand of transport efficiency with the optimal power consumption.

SciVal Topic Prominence

Topic: Tracked vehicles | Vehicles | Wheels

Prominence percentile: 57.885

Author keywords

Air-cushion system | Ground contact pressure | Power consumption | Slippage

Indexed keywords

Engineering uncontrolled terms: Air cushion | Damper systems | Developed model | Dynamic behaviors | Dynamic modeling | Dynamical model | Ground contacts | Load distributions | Motion resistance | Optimal power | Power Consumption | Simulation result | Slippage | Small scale | Support systems | Terrain conditions | Traction coefficient | Tractive efficiency | Tractive effort | Tractive performance | Transport efficiency | Vehicle body | Vehicle performance | Air-cushion system

Engineering controlled terms: Air cushioning | Computer simulation | Peat | Tracked vehicles | Vehicle wheels | Wetlands | Efficiency | Electric power utilization | Experiments | Traction (friction) | Vehicle performance

Engineering main heading: Traction (friction) | Tracked vehicles

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